CLAIMS

What is claimed is:

1. A method for performing a hybridization assay between a target nucleic acid molecule and an oligonucleotide array, the array comprising a surface to which are covalently attached oligonucleotide probes with different, known sequences, at discrete, known locations, the method comprising the steps of:

incubating the array with a hybridization mixture comprising the target under thermophoretic conditions; and

determining the identity of probes to which the target has hybridized.

2. The method of claim 1 wherein the target further comprises a detectable label.

3. The method of claim 2 wherein the label is a fluorescent probe molecule.

4. The method of claim 3 wherein the fluorescent probe molecule is fluorescein.

5. The method of claim 1 wherein the array has a density of at least ten thousand features per square cm.

6. The method of claim 5 wherein the array has a density of at least one hundred thousand features per square cm.

7. The method of claim 6 wherein the array has a density of at least one million features per square cm.

8. The method of claim 1 wherein thermophoretic conditions comprise the application of a temperature gradient perpendicular to the array surface whereby the target is driven to the array surface.

9. The method of claim 8 wherein the array surface is vertical and the temperature gradient is horizontal.

10. The method of claim 8 wherein the array surface is horizontal and the temperature gradient is vertical.

11. The method of Claim 8, further comprising the step of:

reversing the temperature gradient, whereby any unhybridized target is driven away from the array surface.

12. The method of claim 8, wherein the temperature gradient is between about 5 and 25°C/mm.

13. The method of claim 8, wherein the hybridization mixture further comprises an isostabilizing agent.

14. A method for performing a hybridization assay between a target nucleic acid molecule and an oligonucleotide array, the array comprising a surface to which are covalently attached oligonucleotide probes with different, known sequences, at discrete, known locations, wherein such probes have been contacted with a hybridization mixture comprising the target nucleic acid molecule, the method comprising the steps of:

applying a temperature gradient to the array surface whereby any unhybridized target is driven away from the array surface; and

determining the identity of probes to which the target has hybridized.

15. A method for performing a binding assay between a target molecule and an array, the array comprising a surface to which are covalently attached a plurality of binding partners with different, known sequences, at discrete, known locations, the method comprising the steps of:

incubating the array with a mixture comprising the target under thermophoretic conditions; and

determining the identity of binding partners to which the target has bound.

16. The method of claim 15, wherein the target further comprises a detectable label.

17. An apparatus for performing a hybridzation assay, comprising a container connected to at least one temperature control blocks in a heat-conducting fashion, such that a temperature gradient is produced.

18. The apparatus of claim 17, wherein the container is connected to two temperature control blocks in a heat-conducting fashion.

19. The apparatus of claim 17, further comprising an inlet port and an outlet port.

20. The apparatus of claim 17, further comprising an aperture to permit optical access to the container.